NEWSLINE

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Lab garners 7 R&D 100 awards

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WHAT'S INSIDE

LAB NEWS

NNSA supercomputers lead the world's Top500 ranking

The Laboratory's Advanced Simulation and Computing (ASC) BlueGene/L and Purple retained their rankings as the first and third fastest supercomputers on the recently released Top500 list of the world's fastest high performance computers.

These systems, along with other National Nuclear Security Administration supercomputers dedicated to stockpile stewardship, continue the ASC Program's dominance of the twice yearly Top500 ranking, widely accepted as the high performance computing industry standard.

"The rankings confirm DOE's world leadership role in high performance scientific computing," said Dona Crawford, associate director for Computation, who accepted the certificate for BlueGene/L's ranking in a June 28 ceremony at the International Supercomputing Conference in Dresden, Germany.

"The Laboratory, in partnership with the ASC Program, Los Alamos and Sandia, is ushering in a new era in supercomputing with simulations of unprecedented detail and complexity that are advancing the science needed to ensure the safety, security and reliability of the nation's aging nuclear stockpile."

BlueGene/L, a 360 teraFLOP (trillion floating point operations per second) IBM system housed in LLNL's Terascale Simulation Facility (TSF), and reaching 280.6 teraFLOP/s on the Linpack benchmark, retained the top ranking for the fourth straight time. Qbox, a materials science code, recently achieved a new world mark on BlueGene/L for a scientific application (see the June 23 edition of Newsline).

ASC Purple, another IBM machine housed in the TSF, also retained its number three ranking for the second time. Sandia National Laboratories' Thunderbird and Red Storm systems are ranked sixth and ninth consecutively. ASC computers are a resource shared by the three weapons laboratories – Los Alamos, Sandia and Lawrence Livermore national labs.

Both BlueGene/L and ASC Purple are enabling complex simulations of importance to the Stockpile Stewardship Program. For more information about ASC supercomputing platforms, see the ASC Website: http://www.llnl.gov/asci/platforms/platforms.html

The other top 10 systems announced were: IBM's Thomas J. Watson Research Center BlueGene/W, number two; NASA/Ames' SGI Altix Columbia, number four; the French Commissariat a l'Energie Atomique's Bull SA Tera-10, number five; the Tokyo Institute of Technology's NEC/Sun TSUBAME Grid Cluster, number seven; Germany's JUBL Blue Gene Solution, number eight; and Japan's Earth Simulator Center's NEC Earth Simulator, number ten.

For more on the Top500 list check the Web: http://www.top500.org/.

The next list will be released in November at the annual US Supercomputing Conference, which will be held in Tampa Bay, Fla. this year.

During a ceremony at the International Supercomputing conference in Dresden, Germany, the Top500 awarded certificates for the world's fastest supercomputers. From left: Jean Gonnard of the French atomic energy agency (Commissariat a l'Energie Atomique), which boasts the fastest supercomputer in Europe; Dona Crawford, associate director for Computation, with the award for the world's number one supercomputer; and Bruno Pinna of the French computer company Bull, which built the CEA's Tera-10 machine.

Peloton to bring power of the pack computing to the Laboratory

The power of the pack computing is coming to the Laboratory's Multiprogrammatic and Institutional Computing program (M&IC) with the recent award of the "Peloton" procurement to APPRO, a Linux cluster computing company based in Milpitas.

Named for the pack of riders who set the pace in bicycle races such as the Tour de France, Peloton will increase high-end computing resources available for both unclassified research in a broad range of disciplines and classified stockpile stewardship work. The systems are scheduled to begin coming on line in October.

The Lab will receive 14 Scalable Units (SUs) that will be configured into three systems or "clusters." Each SU will deliver 5.53 teraFLOP/s peak (trillion operations per second) from 144 quad socket dual core Opteron nodes. Each node will have 16GB memory and will be interconnected by InfiniBand commodity interconnect from Voltaire and Mellanox.

M&IC will connect 8 of these SUs to create the 44.3 teraFLOP Atlas cluster, which will become the new M&IC capability system. Two of the six remaining SUs will be connected to create a new 11 teraFLOP capacity resource, called Zeus, to replace the unclassified MCR machine.

The Advanced Simulation and Computing (ASC) Program will receive a 4 SU classified system named Rhea for stockpile stewardship work.

Mark Seager, ASC lead for Advanced Technology, said, "With the addition of Peloton, the Laboratory will significantly increase the broad-based computing resources available to meet the ever-increasing demand for the large scale simulations indispensable to advancing all scientific disciplines."

Two of the clusters will be used in the unclassified environment for such diverse research as laser confinement fusion for NIF, global climate modeling, cosmology, materials modeling, turbulence research, as well as other areas.

Brian Carnes, M&IC program lead, noted that through consistent investments, M&IC has grown into a powerful unclassified computing resource that is being used across the Lab to push the limits of computing and its application to simulation science.

"Livermore is a recognized leader in simulation science and provides world-class scientific insight through simulation for multiple programs of National interest. In addition to the world-class science, this capability has helped the Lab recruit and retain leading physicists and computer scientists," Carnes said. "All Lab research efforts are bolstered through the long term development of mission driven scalable applications and platforms. The new systems will soon be fully utilized and will position Livermore to extend the outstanding science and technology breakthroughs the M&IC program has enabled to date."

For more information about M&IC, check the Website: http://www.llnl.gov/icc/lc/mic/

IN PROFILE

Streaking comet fragments illuminate X-ray mystery

By Anne M. Stark
Newsline staff writer

Astrophysicists are narrowing the search for what produces X-ray emission by viewing a comet that is breaking up into at least three dozen fragments as it approaches Earth. Is it the comet itself, the solar wind hitting the comet, or a combination of the two?

Livermore physicists are part of an international collaboration of scientists on their way to figuring it out. By using NASA's Swift satellite and the Japanese Suzaku X-ray Observatory, Greg Brown and Peter Beiersdorfer of V Division, in collaboration with Scott Porter of NASA/Goddard Space Flight Center, Richard Willingale of the University of Leicester, Dennis Bodewits of KVI Atomic Physics, and Konrad Dennerl of the Max Plank Institute, are getting closer to pinpointing what exactly is causing the X-ray emissions from the comet named 73P/Schwassmann-Wachmann 3.

Comets are among the brightest sources of X-rays in the solar system. Scientists think that X-rays are produced through a process called charge exchange, in which highly charged particles from the sun that lack electrons steal electrons from chemicals in the comet. Typical comet material includes water, methane and carbon dioxide.

> *"If we can solve the comet mystery, we can solve Jupiter."*
>
> *– Peter Beiersdorfer*

"The Swift observations are amazing," said Brown, who led the proposal for Swift observation time through a Laboratory Directed Research and Development Exploratory Research project. "Because we are viewing the comet in X-rays, we can see many unique features."

Swift was put in space to locate gamma ray bursts which occur about once every two days. The opportunity to observe X-rays from 73P/Schwassmann-Wachmann 3 was too good to pass up. The comet began breaking apart in 1995 as a result of thermal stress caused by heating from the sun.

"We were lucky to be able to observe a comet while it's breaking apart," Beiersdorfer said. "The radiation is an indicator of what the solar wind and the comet are made of."

Three years ago, Beiersdorfer's team produced X-ray emissions in a laboratory setting by recreating the conditions that exist when solar wind collides with gases surrounding the nuclei of comets.

The team used the Electron Beam Ion Trap (EBIT) facility at the Laboratory to create charge exchange between heavy ions and neutral gas to produce the X-ray emissions, similar to what happens when the solar wind and gases collide in a comet.

The recent research is using that experimental work to understand what they are actually seeing in 73P/Schwassmann-Wachmann 3.

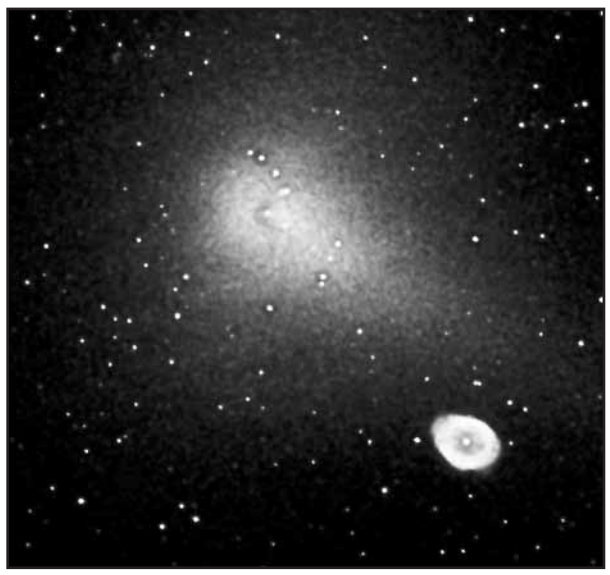


IMAGE COURTESY OF PETER BROWN/NASA/SWIFT/UVOT/PSU/

NASA's Swift satellite captured this image of comet 73P/Schwassmann-Wachmann 3 as it flew in front of the Ring Nebula.

"We're applying the laboratory simulations to analyze the X-rays from the comet," Brown said. He said measuring the charge exchange between the solar wind and the comet could help pinpoint what the comet is made of.

Beiersdorfer said once they figure out where the X-rays come from, the team could then solve why Jupiter emits X-rays.

"If we can solve the comet mystery, we can solve Jupiter," he said.

Scientists from around the world discuss plutonium issues in Monterey

By Bob Hirschfeld
Newsline staff writer

An intensive conference on plutonium and actinides concluded Thursday at the Asilomar conference center near Monterey.

"Plutonium Futures: The Science 2006" attracted nearly 400 physicists, chemists, engineers, academics and metallurgists as well as others from related fields. The program was jointly sponsored by the Lab's Michael Fluss and David Hobart of Los Alamos National Laboratory. The honorary chairs were Tomas Diaz de la Rubia, Lab associate director for Chemistry and Materials Science, and Sig Hecker, the former LANL director who recently retired from Los Alamos and now works at Stanford University.

Attendees from 28 countries — including large contingents from Russia, France and England — attended sessions on the full range of studies of plutonium and other actinides. Diverse topics such as the transformations due to temperature, pressure and other causes; actinide compounds storage; reprocessing of spent materials; and remediation of contaminated sites were among the subjects of papers presented.

Plenary sessions included spirited discussions of advanced energy policy, innovative nuclear power plant designs to replace aging reactors, the need to reprocess or dispose of waste and nonproliferation issues.

Although many attendees are engaged in weapons research, all sessions were unclassified and generally concentrated on the often puzzling scientific aspects of the behavior of plutonium and the other 14 elements collectively known as actinides.

Along with its primary goal of allowing an international exchange of scientific information, the conference also encouraged interest among students, post docs and young scientists by providing conference scholarships to defray the cost of attending the meeting.

BOB HIRSCHFELD/NEWSLINE

Sig Hecker, former Los Alamos director and currently at Stanford University, was a featured speaker at the "Plutonium Futures: The Science 2006" conference.

SCIENCE NEWS

R&D 100 awards cover broad range of Lab expertise

By Stephen Wampler
Newsline staff writer

Laboratory researchers have captured seven awards for developing advanced technologies with commercial potential.

Six teams of LLNL scientists and engineers and an individual LLNL researcher have won plaques from the trade journal R&D Magazine for being among the top 100 industrial innovations worldwide for 2005. They worked with three industrial collaborators and a university space sciences laboratory.

Often dubbed the "Oscars of invention," this year's R&D 100 awards will be presented Oct. 19 during a black-tie dinner in the Grand Ballroom of Chicago's Navy Pier.

"LLNL's seven R&D 100 awards demonstrate the Laboratory continues to be a source of creative technologies that benefit the nation and U.S. industry," said Cherry Murray, LLNL's deputy director for Science and Technology. "These advances reflect the Laboratory's tradition of using multidisciplinary teams working together to solve important national problems."

For this year, the Laboratory garnered more R&D 100 awards than any other institution, tying its previous record number of seven (also achieved in 1987, 1988, 1997 and 1998). With this year's awards, the Laboratory has captured a total of 113 such awards since 1978. Department of Energy (DOE) labs received a total of 41 R&D 100 awards in this year's judging.

Other DOE laboratories winning R&D 100 awards this year were: Oak Ridge National Laboratory, with six awards; Los Alamos, Argonne and Pacific Northwest national laboratories, with five awards each; E.O. Lawrence Berkeley and Idaho national laboratories, with four awards each; Sandia National Laboratories, with two awards; and Brookhaven National Laboratory, the National Energy Technology Laboratory and Ames Lab at Iowa State University, with one award each.

Three of this year's LLNL award-winning technologies could prove helpful in homeland security, with one advance for explosives detection, another for radiation detection, and the last, a surveillance system that could find use in border security.

Six of Livermore's seven R&D 100 award-winning projects received funding during their development from LLNL's Laboratory Directed Research and Development (LDRD) program.

Rapidly detecting explosives

Airport screeners, military personnel and others have a new ally in the war against terrorism – a portable, sensitive and accurate explosives detector developed by researchers at LLNL's Forensic Science Center and the Lab's Center for Energetic Materials.

Called the Easy Livermore Inspection Test for Explosives, or ELITE, the new explosives detector is highly sensitive to more than 30 different explosives, making it one of the most effective explosive detection systems available.

The technology, which can detect explosives within one to four minutes, has been licensed to Field Forensics Inc., a St. Petersburg, Fla. company. It went on the market last October.

Already, Field Forensics Inc. has picked up a host of customers, including the U.S. Army, the Royal Canadian Mounted Police, the Ontario Provincial Police, the Canada Air Marshals, the Queensland Police from Australia and others.

The ELITE technology is light (weighing a fraction of an ounce), small (the size of a 2-inch by 3-inch index card), inexpensive (costing less than $25, and substantially less in higher quantities) and stable (with a shelf life of about two years).

The Livermore employees who developed ELITE are John Reynolds, Peter Nunes and J. Del Eckels, all of the Lab's Forensic Science Center; Randall Simpson, the director of the Center for Energetic Materials; and former Lab employee Jeff Haas.

Radiation detector

Laboratory researchers have developed a new high-precision radiation detector called UltraSpec that operates at very low temperatures, and could assist security officials in identifying even small amounts of nuclear materials.

Developed in conjunction with VeriCold Technologies GmbH, a company based in Ismaning, Germany, UltraSpec offers comparable precision to mass spectrometers for quantifying material composition, yet its operation can also be automated so that non-specialists can operate it with the push of a button.

Lab researchers created the instrument's sensor and first prototype spectrometer, while VeriCold Technologies developed the cooling system for commercialization. Unlike the cooling systems for many other high-precision detectors that use liquid nitrogen and liquid helium, the UltraSpec system is mechanically cooled, reducing the need for frequent maintenance to replace the coolants.

UltraSpec is unique in its ability to detect gamma rays, which are emitted by all nuclear material, with ultrahigh resolution. It provides an energy resolution that is 10 times better than conventional gamma-ray spectrometers, allowing mixtures of nuclear isotopes to be measured with high precision. UltraSpec can also measure neutrons with ultrahigh resolution, which can be desirable in some situations.

For example, if a light element such as oxygen were bound to a nuclear isotope, a gamma-ray spectrometer would not be able to detect the presence of the oxygen because oxygen doesn't emit gamma rays. However, when configured as a neutron detector, UltraSpec can detect and measure the amount of oxygen or other light elements that may be bound to a nuclear material.

This capability is not only important for identifying illicit sources of nuclear material, but also for ensuring the safety of stored nuclear material at nuclear power plants, weapons stockpiles and waste facilities.

UltraSpec has been developed by Lab employees from two directorates, Physics and Advanced Technologies (PAT), and Engineering. They include: Stephan Friedrich, Simon Labov, Thomas Niedermayr, Owen Drury and Jan Batteux. Funding for the project came through the Nonproliferation, Homeland and International Security (NHI) Directorate.

Three LDRD grants, starting in 1987, provided an important boost to the UltraSpec technology. The early work was for the development of low-temperature, high-resolution X-ray detectors for astrophysics.

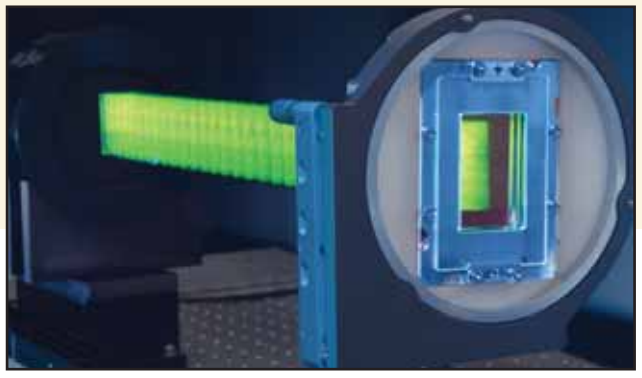
Surveillance system shift

Lab physicists and engineers have created the Sonoma Persistent Surveillance System, which offers the first integrated, broad-area, high-resolution, real-time motion imagery system for surveillance applications.

Sonoma is unique in its ability to provide continuous, real-time video imagery of an area the size of a small

BABEL

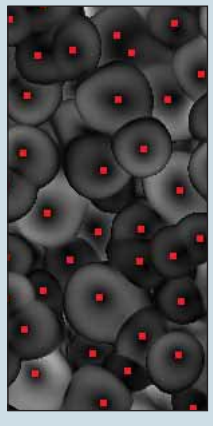
Top, Babel helps computer scientists developing simulation codes overcome language incompatibilities among software libraries. Right, an yttrium calcium oxyborate (YCOB) crystal is shown next to an apple and a ruler, while below, an YCOB crystalline plate in an optical mount (foreground) cut from a crystal boule is shown. This YCOB crystal plate is oriented for second harmonic generation (converting infrared 1047 nm light to the second harmonic, 523.5 nm or visible green light).



PHOTOS BY BRYAN QUINTARD AND MICHAEL ANTHONY

ON THE COVER:

Sapphire software is being used to characterize and track bubbles and spikes in an 80 terabyte data set from a three-dimensional, high-fidelity simulation of the Rayleigh-Taylor instability. This image shows the bubble counts using the magnitude of the X-Y velocity at the bubble boundary. Only 1/36 of the two-dimensional data are displayed.



city with resolutions sufficient to track up to 8,000 moving objects within the field of view.

The Sonoma system was designed to provide real-time data for actionable information in situations such as monitoring traffic, special events, border security and harbors.

If a Sonoma system had been available in the aftermath of the Katrina and Rita hurricanes, emergency responders would have had real-time information on roads, water levels and traffic conditions, possibly saving a number of lives.

During the past year, Lab officials have received a number of inquiries about technology transfer and the commercialization of the Sonoma system and technologies. Sonoma is expected to cost about one-tenth the price of comparably sized sensor systems.

Sonoma has been developed by employees in four directorates – NHI, Computations, Engineering, and PAT. They include: Charles Thompson, Michael Kartz, Deanna Pennington, Gary Stone, David Bloom, Robert Sawvel, Allen House, Aaron Wegner, Curtis Brown and Michael Newman, as well as former employees Laurence Flath, John Marion and Daniel Knight.

Sonoma's first-year funding came from an LDRD grant and the project has since been funded by the National Nuclear Security Administration's NA-22 Office of Nonproliferation, Research and Engineering.

Changing the 'color' of laser light

LLNL laser scientists have developed a high-average-power wavelength conversion device that can change the "color" of laser light, permitting large-aperture high-average-power lasers to operate at half the wavelength of the laser crystal's natural emission wavelength.

The device, which uses an yttrium calcium oxyborate (YCOB) crystal, was developed in tandem with Crystal Photonics, Inc., a company based in Sanford, Fla.

Many of today's lasers operate in the infrared portion of the spectrum – a color or wavelength that is not the most efficient for some applications. Both the YCOB crystal's ability to handle heat and its ease of growing could permit some of these lasers to operate more efficiently at the shorter wavelength.

As examples, ceramics and plastics could be more efficiently machined with ultraviolet light, and copper metal for electronic circuit boards could be more efficiently cut with green light.

The YCOB wavelength converter holds the current world record for an average-power, high-pulse-energy laser at 225 watts of 523.5 nanometer light, at a repetition rate of 10 hertz and 22.5 joules per pulse. One YCOB crystal can replace eight optical components.

The conversion device and YCOB crystal were developed by LLNL employees in the National Ignition Facility and Engineering directorates. They are: Chris Ebbers, Zhi Liao, Kathy Allen, Kathy Alviso, Andy Bayramian, Mike Benapfl, Camille Bibeau, Rob Campbell, Manuel Carrillo, Barry Freitas, Robert Kent, Tony Ladran, Rod Lanning, Steve Mills, Stan Oberhelman, Steve Payne, Noel Peterson, Greg Rogowski, Steve Sutton, Kathleen Schaffers, Steve Telford, Peter Thelin, Everett Utterback, Dave Van Lue and Bruce Warner.

The development of the YCOB crystal is a direct consequence of LDRD funding from 1997. This money was awarded to study the use of a solid state laser as a potential replacement for the copper vapor lasers in the Atomic Vapor Laser Isotope Separation program. The funding allowed researchers to study new nonlinear optical crystals.

Seeing planets better

An LLNL physicist, David Erskine, and Jerry Edelstein, an astronomer at the UC Berkeley Space Sciences Laboratory, have developed a technique called "Externally Dispersed Interferometry" (EDI) to conduct precision measurements of the Doppler velocities of stars or sunlit targets.

Thomas Niedermayr is shown assembling and testing an UltraSpec prototype spectrometer.

Using an interferometer-spectrograph system, the EDI technique already has been used by a University of Florida researcher to detect the planet around 51 Pegasi and also to discover a new planet in the constellation Virgo. This is the furthest planet discovered with the Doppler effect using a telescope of less than one meter in diameter.

The Doppler effect is a method for precisely measuring the velocities of stars – and the method works because a planet tugs on the star, causing it to wobble, a change that can then be measured.

Using a $14,000 interferometer, the EDI technique provides a threefold improvement in spectral resolution at a tiny fraction of the cost of a $4 million conventional grating spectrograph. The EDI system also is much smaller, weighing 50 pounds and about the size of a television set, compared with the conventional grating spectrograph, which weighs 16,000 pounds and is the size of a kitchen. It is believed that with EDI more universities and colleges that could otherwise not afford multi-million installations could now conduct precision Doppler measurements.

In conjunction with collaborators from Cornell University and UC Berkeley, Erskine has received a three-year grant from the National Science Foundation to search for planets around low-temperature stars in the infrared region. The work is under way at the Mount Palomar Observatory near San Diego.

Two LDRD grants were received to study the EDI technology. In the first, the use of EDI for measuring Doppler velocities of starlight as a means for detecting planets was demonstrated. In the second, the high resolution spectroscopy application was explored.

Sapphire extracts useful information

One of the great challenges researchers face today is extracting the information they need from enormous data sets. A Laboratory team in the Center for Applied Scientific Computing (CASC) has developed analysis algorithms allowing the exploration of large, complex and multidimensional data sets. The technology has been dubbed Sapphire.

"Our ability to generate data far outstrips our ability to explore, analyze and understand it," said Chandrika Kamath, leader of the Sapphire project. "Data that was measured in gigabytes (billions of bits of information) until recently, now is being measured in terabytes (trillions of bytes), and will soon approach the petabyte (1,000 trillion bytes) range.

"Often, the data are complex, available either as time-series data, or as images. In order to achieve our scientific goals, we need to fully exploit this data by extracting all the useful information from it. This is the idea behind Sapphire," Kamath added.

By applying ideas from data mining, video processing, statistics and pattern recognition, Lab researchers are developing new computational tools and techniques that are used to extract useful information from huge data sets.

Sapphire technology is being applied to a variety of disciplines, including plasma physics experiments and simulations, remote sensing imagery, video surveillance, climate simulations, astronomy, and fluid-mix experiments and simulations. The Lab team has six patents on Sapphire technology.

Besides Kamath, other members of CASC team in the Computation directorate are Abel Gezahegne, Cyrus Harrison, and Nu Ai Tang, as well as former Lab employees Erick Cantu-Paz and Samson Cheung. Sapphire, which had some of its basic research supported by LDRD, is an ongoing effort. The team continues to refine their tools and apply them to new data sets in various problem domains.

Bridging the language barrier

Much as people from different countries have difficulty communicating across linguistic barriers, computer scientists developing simulation codes face language incompatibilities among the software libraries they must use. Babel – pronounced "babble" – is an LLNL-developed tool that addresses this problem.

Babel is distinguished by its high-performance language interoperability, enabling cross language communication with minimal runtime overhead. Scientific software libraries are written in a number of programming languages: Fortran, C, C++, or a scripting language such as Python. Language differences often force software developers to generate mediating "glue" code by hand, a time consuming process. In the worst case, computational scientists must rewrite a library from scratch or not use it at all.

Babel is radically changing the way scientists compute. Scientists who use Babel, or Babel-based component models, are given the ability to integrate cheaply almost any library or third-party tool available into their scientific application. This immediately gives them access to a whole host of best-in-class technologies that were formerly too difficult or expensive to integrate. Babel also ends the old "language wars," as the best language for the job can be used for each component of the system.

A Lab team from CASC in the Computation directorate led by Tom Epperly and Gary Kumfert has developed Babel to enable the creation, description and distribution of language independent software libraries. Other current team members are Tamara Dahlgren and James Leek. Former team member Scott Kohn played a key role in the original LDRD project.

In the original LDRD-funded effort, researchers studied the language interoperability issues associated with component technology for high-performance parallel scientific applications and developed tools that simplified the process of writing scientific applications using different programming languages.

For more information about Babel, check the Web at: http://www.llnl.gov/CASC/components/

LABORATORY NEWS

A novel 'Day In The Life' of Lab physicist John Perkins

By Bob Hirschfeld
Newsline staff writer

By day, he's a serious physicist thinking up innovative designs for fusion reactors.

But at night, watch out. John Perkins puts on his pork-pie hat and rocks out on keyboards with Jukebox Heros.

And now Perkins can add another occupation to his resume: novelist. He's the author of *A Day in the Life*, published earlier this month by Booklocker.

The 312-page novel is based on the well-known conspiracy theory, which first surfaced in 1969, that the Beatles' Paul McCartney had died in an auto accident.

At the time, distraught fans pointed to numerous "clues" such as the famous photo on the cover of the Abbey Road album, in which Paul is the only band member crossing the street barefoot and out of step with the others, his eyes closed, and, although left-handed, holding a cigarette or "coffin nail" in his right hand.

There were numerous other "indications" of a massive cover-up, according to the fans who believed the story. For example, listeners supposedly could hear the words "turn me on, dead man, turn me on, dead man" when the song "Revolution 9" on the so-called "White Album" is played backwards.

Perkins' novel is a thriller in which the "Paul is dead" theory becomes reality, and the death is covered up by a shadowy corporation intent on maintaining its financial control of the Beatles.

"It's an alternative history, just like the DaVinci Code," said Perkins. Many of the occurrences in the story, such as dates and recording sessions and equipment, are based on fact.

The Beatles were a major influence in Perkins' formative years. He grew up in London surrounded by music. He even dropped out of school at age 16 and spent two years in several rock 'n' roll bands. They played all across England and Scotland, even once in the same pub as Elton John, although Perkins admits, "I didn't know him, and at the time, he was also unknown."

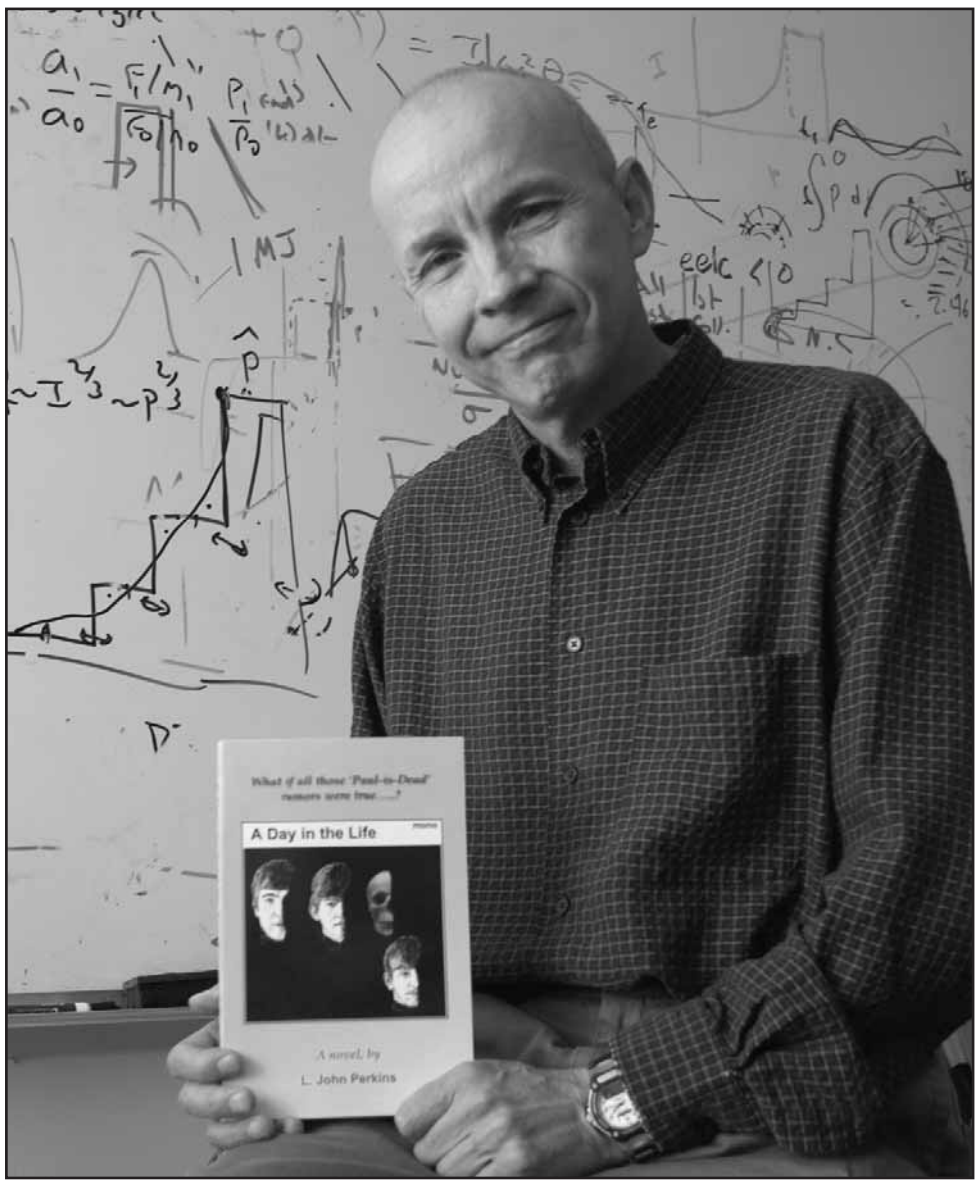
But unlike (Elton) John, (John) Perkins never hit the big time. Instead, he headed back to school. "Originally I intended to study electronics, but I was seduced by physics," he says.

After earning his degree from the University of Birmingham in 1979, Perkins emigrated to the United States, becoming a research assistant professor at the University of Wisconsin, and then moving to San Diego for a job at General Atomics. He joined the Lab in 1983 to work on fusion projects, first on magnetic fusion, and now on laser inertial confinement fusion.

But there is still plenty of time for music. Perkins and his four fellow band members perform in the Tri-Valley area as well as at venues as disparate as Konocti Harbor Resort in Clear Lake, the Stockton Asparagus Festival, and a Maui concert for the National Association of Jack-in-the-Box franchisees.

As for his writing career, Perkins says it took him two years to write the book. Now he is hoping to turn it into a screenplay. "It could make a great movie," he says. "I'm waiting for Steven Spielberg to call with a million-dollar offer."

In the meantime, as he waits, Perkins fills the whiteboard in his office with sketches and diagrams of target designs for fusion power plants of the future.



JACQUELINE MCBRIDE/NEWSLINE

John Perkins with his novel, "A Day In The Life."

For more information on *A Day in the Life* (Booklocker; $16.95) see http://www.booklocker.com/books/2290.html.

Countdown begins for completion of the National Ignition Facility

The countdown is under way for the National Ignition Facility. Fewer than three years remain until completion of the Lab's (and the world's) biggest and most ambitious science project, and the beginning of experiments leading to fusion ignition. The project is now 87 percent complete, and with 16 beams out of the 192 now commissioned, NIF is already producing more infrared energy output than Nova could do when it was fully operational.

And there is more good news from the National Ignition Facility (NIF). Associate Director Ed Moses congratulated his staff on its recent accomplishments and gave them an update on the project's progress so far.

Late last week, he issued a directorate-wide email in which he said it "was a propitious day for all of us. It is now 1,000 days until the scheduled completion of the NIF Project and the beginning of the Ignition Campaign experiments."

Moses pointed to specific accomplishments, including:

• NIF is 87 percent complete and the Line Replaceable Unit (LRU) installation count is just reaching 2,300 (37 percent of the total).

LRUs are the modular components containing laser optics that are installed into NIF's beampath infrastructure to inject, amplify and transport each of NIF's 192 laser beams to the target chamber. A total of 6,216 LRUs will be installed when the facility is complete. There are 41 different LRUs required for each laser beam, each weighing between 20 and 1,000 kilograms. Examples of LRUs are the flashlamp and laser glass cassettes that are installed into the multi-pass and power amplifier sections.

• The second bundle (each bundle consists of eight beams) has been activated. Combined, the two operational bundles produce 300 kilojoules of infrared energy (this is about three times what Nova could do when it was fully operational).

• The recently completed Precision Diagnostic System Campaign showed that NIF can meet all performance requirements for both project completion and for the most demanding ignition experiments.

PEOPLE NEWS

RETIREES' corner

Glenn Hage (Computation, 1990) and wife Audrie celebrated their 40th anniversary by retracing their 1966 honeymoon trip to Santa Barbara. They noted that Solvang seems more crowded and more expensive since the movie "Sideways."

Tom (Electronics Engineering, 1990) and **Joan** (Telecommunications, 1990) **Lincicome** took a trip to Las Vegas in May to celebrate Tom's birthday. Tom has wanted to see the Atomic Testing Museum in Las Vegas since it was completed about ten years ago. It was very interesting, especially the Ground Zero Theater which resembles a concrete bunker and features a large screen show describing the history of test effects from a variety of viewpoints. They took in a couple of shows and buffets, and a day trip to Red Rock Canyon. But, the highlight was the museum — especially interesting to people who spent a lot of time at the Nevada Test Site.

Camille Minichino's (Electronics Engineering, 1990) eighth mystery novel, "The Oxygen Murder," will be released in August. All are invited to a launch party at Towne Center Books, Pleasanton, on Sunday, Aug. 27 at 2 p.m. Join Camille and Dick Rufer (Electronics Engineering, 1990) for refreshments, games, and prizes. Camille will also appear at the Livermore Library on Sunday, Sept. 24 at 2 p.m. with S&TR's **Ann Parker**, whose second Silver Rush mystery, "Iron Ties" has been released to rave reviews.

Gus Carlson's (Mechanical Engineering, 2000) son Jeff sold his first novel, a science fiction thriller entitled "The Invisible Sea." He had been selling short stories for several years, but this was his major breakthrough into the publishing world.

Eighty-six people attended the retirees picnic on Wednesday, June 21. The weather was perfect, the food was great and visiting with old and new friends was thoroughly enjoyable. July's retiree luncheon will be at noon on Wednesday, July 19, at the Elks Lodge in Livermore, 940 Larkspur Drive. (Reservations: www.llnlretirees.org). The speaker will be Lee Yonker, associate deputy director at the Lab, discussing "Change and Continuity at LLNL."

There is no Travel Group meeting until January. While you are traveling, take notes and consider sharing your experiences with the Travel Group and the Retirees' Corner when you return.

Send input to Jane or Gus Olson: e-mail: AugustO@aol.com or JaneRubert@aol.com: phone: (925) 443-4349, address: 493 Joyce St., Livermore, CA 94550.

A meeting of the minds

JACQUELINE MCBRIDE/NEWSLINE

(Left to right): Doug Wright, Larry Sanford, Erich Ormand and Jessica Gowin, from Physics and Advanced Technologies (PAT), celebrate after winning a spot in the final round of the first LLNL American History Bowl. The PAT team will be joined in the final round by directorate teams from Nonproliferation, Homeland and International Security (NHI) and Administration and Human Resources Directorate (AHRD) from noon to 1 p.m. Wednesday, July 19, in the Bldg. 123 auditorium. The event is sponsored by the LLNL Armed Forces Veterans Association (LLLAFVA), NHI and the Work-Life Center.

IN MEMORIAM

Earl L. Augusta

Earl Augusta, a former Lab employee, died on June 22 in Manteca. He was 84.

Born on August 27, 1921, he had lived in Ripon for 22 years and previously resided in Pleasanton. He served in the U.S. Army from 1941 to 1945.

Augusta worked as a mechanical technician at the Lab. He was active in local politics in both Ripon and Pleasanton. He was a city councilman in Ripon from 1985-87. He was on the Ripon Planning Commission and was also a past president of the Ripon Senior Center, where he was a bus driver. He was past president of the Ripon Lions Club.

He was preceded in death by his wife, Barbara Augusta, who died in January. He is survived by his daughters, Cheryl Willis of Pleasanton and Susan Kirk of Ripon; sister, Marjorie Chastek of Oakley; six grandchildren and two great-grandchildren.

Services were held in Ripon. Donations may be made in his name to the Ripon Senior Center, 433 S. Wilma Ave., Ripon, 95366.

Ronald G. Brown

Ronald Brown died June 20 in Walnut Creek. He was 62.

A native of Missouri, he had lived in Livermore for 34 years. He worked as a maintenance machinist at the Lab for 27 years, retiring in 2004. He was a graduate of Washington High School in Fremont.

He enjoyed coaching soccer for his sons' soccer teams, taking family vacations to Mexico, camping and boating and spending time with his grandchildren. His hobby was playing pool in the Livermore Pool League.

He is survived by his wife of 39 years, Jan Brown; sons Rodney and Ryan Brown of Livermore; a sister Randee Smith of Fairoaks; and grandchildren, Makenzie and Jackson Brown, both of Livermore.

Services were held in Livermore. Donations may be made to a favorite charity.

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Nuclear exercise tests nation's emergency response

By David Schwoegler
Newsline staff writer

For three seemingly endless days and nights, the eyes of the U.S. Air Force 90th Space Wing, the NATO-Russia Council members, the DOE, the DoD and the world press focused on the windy plains of Cheyenne, where railroad tracks and grazing antelope intersect the community.

And there, in the 2006 CAPEX scenario, an errant fuel truck collided with a payload transporter moving an ICBM warhead, initiating an emergency response scrutinized the world around.

CAPEX stands for "Capability Demonstration Exercise." In December 2004, the U.S. Secretary of Defense approved a NATO-Russian Council agreement to host reciprocal nuclear weapon accident demonstrations. Besides serving as a multi-agency field demonstration for 27 NATO-Russia Council member-nation delegates, the exercise created a forum for exchanging ideas. Prior years' demonstrations have been held in Russia and in the United Kingdom. Next year's event will take place in France.

The exercise was sponsored by DoD's Defense Threat Reduction Agency and hosted at F.E. Warren Air Force Base. Don Daigler of NASA Headquarters represented the Department of Energy and NNSA as the Senior Energy Official. The LLNL Accident Response Group (ARG) participated in the exercise under the direction of Robb Hadley of RN Division. ARG exhibited the liquid abrasive cutter in the static display, and then used the device the next day to slice open the damaged payload transporter during the exercise.

In addition to demonstrating a Joint Operations Center and a Joint Information Center, at the heart of the exercise was the simulated accident site. There delegates watched the weapon recovery, as responders first x-rayed the transporter to learn the exact location of the weapon. Then LLNL's liquid abrasive cutter opened access to the inside. The cutting was performed in full view of the assembled audience of Air Force personnel and NATO-Russian Council delegates.

Finally an explosive ordinance disposal team packaged the warhead for transport by DOE. All the while activities were observed through stand-off monitoring, using a portable integrated video system. Contaminants were contained with a contamination control station.

A day earlier, delegates and members of the world press viewed several static displays showcasing responder assets housed indoors, where participants could get up close and ask questions of technical personnel. DOE's assets included the Aerial Measuring System; the National Atmospheric Release Advisory Center at Livermore; the Accident Response Group, with its Liquid Abrasive Cutter and Portable Integrated Video System; the Federal Radiological Monitoring Assessment Center; and the Radiological Emergency Assistance Center/Training Site.

CAPEX was the culmination of nearly a year of careful planning and preparation, including "Comanche Warrior," a three-day rehearsal exercise conducted at Warren AFB during the preceding week.

DTRA

Accident Response Group workers atop a damaged payload transporter begin "render safe" activities during the 2006 Capabilities Demonstration Exercise, or CAPEX, at F.E. Warren Air Force Base in Cheyenne, WY.

Plasma physics work by Tabak and Wilks rewarded

Lab plasma physicists Max Tabak and Scott Wilks have been selected as recipients of the 2006 Award for Excellence in Plasma Physics Research of the American Physical Society (APS) along with two physicists from Japan and one from Great Britain.

The recipients were cited "for developing the fast ignition inertial fusion concept and for demonstrating key aspects of it in a series of experiments that have catalyzed the worldwide effort on the concept."

The revolutionary idea of fast ignition was conceived by Tabak and other researchers in 1990. It is a technique for use in developing fusion energy, essentially optimizing the use of the laser energy by giving a target a preliminary burst of laser energy followed by second shorter burst that ignites the resulting plasma.

JACQUELINE MCBRIDE/NEWSLINE

From left: Scott Wilks and Max Tabak are recipients of the 2006 American Physical Society's Award for Excellence in Plasma Physics Research.

The use of fast ignition could significantly reduce the cost and energy requirements in laser fusion power plants of the future. Tabak, Wilks and many other scientists at LLNL and around the world also are exploring different target designs that will add to the efficiency of the entire process.

Tabak and Wilks will receive their awards at the annual meeting of the APS Division of Plasma Physics to be held Oct. 30 to Nov. 3 in Philadelphia.

Last year, Tabak was awarded the Edward Teller Medal from the American Nuclear Society.

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